HydroSeminarSeries 2015   Episode 5

Jeff Simley: [0:10] Jeff Simley with U.S. Geological Survey, and this is our Hydrography Webinar Series, webinar 5. Like I said, I'm hosting today, and helping me out also is Sue Buto, Al Rea, and Addison Jason, also of the U.S Geological Survey.

[0:28] The purpose of this webinars is, one, to share success stories from users who have solved real, real world problems using hydrographic data, to provide information on the NHD WBD and related products and provide a forum for users similar to what might be encountered in a conference setting.

[0:51] Some of the example topics that we cover in this seminar series are hydrology, resource management, pollution control, fisheries, emergency management, mapping, and elevation hydrography integration.

[1:06] Today, our main speaker is going to talk about The USDA Forest Service Watershed Condition Framework: An approach for assessing and improving watershed condition with Mike Eberle. Following that, we'll have questions and answers. We'll talk about that protocol in a second.

[1:21] We'll have two lightning talks today, be as basically five minute long talks. First of all, Preserving High Quality Riparian Vegetation with David Richey. Second, Streamgage Drainage Area Boundaries with Curtis Price. We'll follow that with you answering a few questions for us about the value of this session.

[1:43] The audio is in listen only mode, so we can't hear you out there. For audiovisual problems, the best thing to do is to try to log out and log back in again.

[1:57] Questions and answers, we'll use the chat feature in WebEx, so there won't be an opportunity for you to verbally ask questions but rather do it through the chat. Sue Buto and Al Rea will monitor those questions that come in from the chat.

[2:16] When we come to the end of Mike's talk, then they'll start reading off some of those questions, and Mike will have a chance to answer them. We'll do that for about 10 minutes or so. Then at the very end of the session, after the lightning talks, just be aware that there is some poll questions to be aware of.

[2:35] Which parts of the presentation were most valuable? Which parts of the presentation were least valuable? What topics are you interested in learning more about in the future?

[2:46] I'll also announce that the next Hydrography Seminar Series is January 21. We'll be talking about High Resolution NHD Plus, so watch for announcements about that and hope that you can join us then.

[3:02] Today's main topic, once again, is USDA Forest Service Watershed Condition Framework: An approach for assessing and improving watershed condition with Mike Eberley.

[3:11] Mike is the Forest Service's Surface Water Program Leader. Since coming to the Forest Service in January 2011, his work has primarily focused the agency's implementation of the Watershed Condition Framework through the development of policy, technical resources, and national guidance.

[3:25] In addition, Mike has assisted with the effort to implement the agency's National Best Management Practices Program. Mike has worked for the USDOI's Bureau of Land Management as its Water Lead and as the US Fish and Wildlife Service's Pacific Region's Chief of Water Resources, in Portland, Oregon.

[3:42] With that, we'll turn it over then to Mike.

Mike: [3:56] OK, we're getting there. It doesn't want to stay on. There we go. We're going to try with this one.

[4:24] Thank you very much for inviting me to speak on the Watershed Condition Framework today. The Watershed Condition Framework...

Allyson Jayson: [4:35] Mike, I'm not seeing it yet. Anybody else seeing it?

Al Rea: [4:39] No, we're not seeing it.

Allyson: [4:42] Can you try sharing again?

Al: [4:47] You may have to go to that quick start tab to see the "Share My Desktop."

Allyson: [4:55] There you go. I still see a green screen. There you go. I see it.

Mike: [5:08] All right. Thank you very much. Sorry for that little glitch there. I was going to say that the watershed condition framework uses the GIS, specifically the NHD WBD data, not only as an analysis tool for the restoration work it does but also we're finding it very helpful as a huge communication tool.

[5:33] A big part of the watershed condition framework is the interaction it allows for individual forests to have with partners in their area. When they can look watersheds or subwatersheds on the map. Take a look at the resources involved, it just makes the communication aspects of it much cleaner and much easier. So, they're all speaking of the same language.

[6:04] So throughout the talk, I will be talking about priority watersheds. I wanted to be clear that these are the 12 digits, so they're realistically the subwatersheds. So, they're the 12 digit HUC 6s. That's the entity that was decided to focus on with the watershed condition framework.

[6:35] So today's talk, I'm going to give you a little bit of background on why we initiated the watershed condition framework I'll talk a little bit. on what the WCF is, and then at the end, we'll bring in a little bit of some GIS data, and tools, and resources that we've been using to move forward.

[6:51] First, a little bit about the Forest Service. The mission of the Forest Service is to sustain health, diversity, and productivity of the nation's forest and grasslands for present and future generations. And that guys is a lot of what we do.

[7:05] So where are the national forest and grasslands? Just a quick overview of, the green are the forests and the tan areas are the national grasslands. At a glance, the Forest Service is what I consider four of the largest land management agencies in the United States.

[7:28] There is of course the BLM, Forest Service, Park Service, and the Fish and Wildlife Service. Forest Service manages about 193 million acres. That's about eight and a half percent of the total area. It was broken up into nine regions that we use for they're geographically aligned of course.

[7:49] It consists of about 155 national forests. Some forests have been combined, so look it up. You may see fewer, probably closer to 114. But as far as individually named forests, there's 155 of them. We're in almost every state. There are six states that we're not presently in.

[8:12] So some fast facts about the Forest Service, 18 percent of the water in the United States comes off of Forest Service lands. Of course, that's a lot more higher percentage in the Western US than the Eastern United States.

[8:28] We've provided drinking water to over 180 million people. Lots of habitat, lots for the threatened the endangered species, and, this is a good one, one of the things we do is the multiple use mandate. People come on Forest Service land for many reasons including of course fishing and kayaking, canoeing, on over the 220,000 miles of streams and 2.3 million acres of lakes, ponds, and reservoirs.

[8:59] So, it's a lot of water, and water is a big deal for us. The focus of the chief, of course, improvement of the water resources. Maintaining the water quality of the Forest Service recently laid out a strategic plan covering FY 15 to FY 20, 2015 to 2020. One of the major goals is to keep providing or improve upon providing clean water to the American public.

[9:33] Also including is sustaining of jobs and the restoration of the landscapes. So now, let's try to focus on the WCF. So why did we develop the Watershed Condition Framework? Well, certainly, restoration wasn't new to the Forest Service, but what had happened is we were having trouble really being accountable and holding ourselves accountable.

[9:53] A lot of restoration money came to the Forest Service, and we were doing these little restoration projects here and there. There was no way for us to roll up that information and show congress that all of these tiny restoration efforts were actually beneficial in the end.

[10:21] So the Watershed Condition Framework was organized, and it is a way to show the impacts of the restoration on both the local scale and then also up to the national scale.

[10:40] So, it's a comprehensive approach for restoring watersheds. The WCF focused primarily on the aquatic side of restoration. It does have some accounting for upland terrestrial restoration and impact that may have on the watershed health, and that is taken into account.

[10:57] The primary focus is on aquatic aspects, and we'll see that soon. As I mentioned, the multiple scales is very important. It's hard to do, to find a solution that means something on the ground when you're working with partners and has that same action roll up and still tell a story at the national level.

[11:25] So the Watershed Condition Framework, I'm going to review the six steps, go over them pretty quickly. It's a six step circular process and coming back to the beginning is an important aspect. Step A is really doing an assessment on what is the condition of the watershed.

[11:45] It was a rapid assessment back in late 2010, early 2011, when we initially did this. We had a set of criteria that we set out as far as how the watershed should score based on the indicators and how it scored out. It was done by a group of professionals of mixed disciplines. You can see there from hydrologists, a lot of fish biologists, soil scientists.

[12:20] It was really heavily relying on the professional judgment of the employees. Number three there, it did use a lot of local data, GIS data layers, and national databases. Now, one thing that we're real proud of on the Watershed Condition Framework is this is a nationwide effort that was done in a consistent basis.

[12:55] To do that with the Forest Service or any one of the land management agencies on a large scale, to develop that consistency, is a very difficult thing to do, especially since some areas are data rich and other areas might be data poor. So trying to write standards to follow is a tightrope sometimes.

[13:16] These are the 12 indicators. The model on the left side just shows you how we organized those. There's aquatic physical and aquatic biological and then terrestrial physical and terrestrial biological. One thing we're going to come back to at the end, is really the first seven from water quality down to soils.

[13:42] Those are the indicators that really lend themselves well to the data that's available and using GIS or NHD and WBD. As I said, I'll talk more about that later.

[13:57] We did the assessment, and this is the results of the assessment. The green areas are where the watersheds were determined to be functioning properly. The yellow is where the watersheds were functioning at risk. The red areas are where the impaired function.

[14:17] This is how it came out, I guess, statistically. Out of 15,000 watersheds that we assessed, just over half of them were functioning properly and only three percent were impaired.

[14:33] Step B was after we did the assessment, we had to figure out how we were going to focus our efforts and on which priority watersheds we were going to focus. Selection criteria were active collaboration and partnership opportunities. Like I said before, partnerships and nurturing of partnerships was an important aspect of the WCF.

[15:09] We had to talk to think about where there were ecological or social or economic considerations and what other partners were going on, with other agencies as well. It seems important to understand that this wasn't necessarily looking at the worst watersheds and trying to work on them first. That way of looking at watershed restoration could be very expensive.

[15:31] Those watersheds, the red ones, can be very compromised and would take a lot of money to improve those, whereas sometimes even the what we call the green watersheds, or the watersheds that are already functioning properly, they could be trending downwards for a variety of reasons and by putting a little money into those watersheds. Little investment and resources, it could keep them at the green level.

[15:59] So all of these considerations had to be taken into account. The starred areas are where the first round of priority watersheds were. I do want to say something, that address at the bottom, the interactive mapping address, it was just bad timing, I guess.

[16:22] About three weeks ago, they were transferring a bunch of data and updating the, not the database, but where the data is housed, and trying to update it. Going through that update, it made the interactive mapper not functional. We had been using it for years. It worked out real well, and now it's not working.

[16:49] We are hoping to get it back online in about a week or two. I wanted to let everyone know that. So once we figure out where we're going to do the work, we have to try to think about what work needs to be done. So we developed a watershed restoration action plan. Again, we reached out to partners. We take a look at a lot of the data that we have.

[17:11] This is an excellent point of being able to map out on the different HUCs exactly what areas are impaired and whether they are doing well using those 12 indicators.

[17:28] Those are really helpful tools to bring people around and to get the partners that we wanted. There are partners who are big believers in fish passage or fish, and they can see where maybe the fish weren't able to move around as well or where there are issues associated with that.

[17:44] We have partners that are very focused on our road systems, and they can see where the roads were having issues or potentially contributing to the detriment of the watershed. These maps were very helpful.

[18:02] What goes into a WRAP? The list of partners, the key watershed issues, important ecological values. And then really, a real important thing is really how much this is going to cost to help it improve this watershed.

[18:21] Step B of the Watershed Condition Framework is to implement the projects in the WRAP. Initially, we thought it would take between three and five years, but we're finding out that they are taking a little bit longer. Up to six or up to seven years potentially depending on how much NEPA needs to get done and just how prepared the forest was initially ready to do those.

[18:53] Then the last, or the second to the last step is tracking those accomplishments. So when these essential projects were completed on the ground, put them into a GIS database and map out the area that was worked on or that was improved, and be able to track it systematically.

[19:12] This is an important aspect for the Forest Service. A lot of things that we do are focused on outputs and outcomes, meaning board-foot of timber or soil and water acres improved, or those types of very high level targets.

[19:30] The Watershed Condition Framework is a new type of a target called...It's more of an outcome. It's a recognized target that takes years to develop and to achieve. It's not a per year basis. The Forest Service is still having trouble speaking in terms of outcomes over output. Outputs has been around for years and are very much a part of our culture.

[20:10] Finally, the step back is to monitor. If we say, "Did we do what we said we are going to do, and does it have the effect that we thought it would have?" What we thought was the impact we thought it would have is based largely on personal or professional experience and expertise. But it's also based on models that we can build. There are many GIS models, and I'll talk about those also.

[20:37] Even though the interactive map is not currently working, it is very useful for our partners and the general public to go in and take a look at the work that we're doing through the interactive mapping software.

[20:55] Let's see. This is an example. If you zoom in to anywhere you want in the United States and look at the different HUC codes, you can pick those, and the information that's shown are the indicator scores.

[21:13] You can take a look at the copy the watershed restoration action plan. You can take a look at what partners are working with us to improve that area, and what the projects actually are. We even put information on there that describes why that watershed was determined to be a priority. Unfortunately, it's not working. I wish it was.

[21:38] Going back to the indicators and taking a look at the top seven, I just wanted to give everyone an idea of what these indicators say or general description. Water quality is pretty straight forward. It expresses the operation of physical, chemical and biologic components of the water quality.

[21:48] I won't read all of these to you, I wanted to give everyone a sense on the very high level general question that they're asking. For water quality I'm going to go a little deeper. This is the rule or the guidance that was given. You can see for the water quality indicator. It's over here. The attributes, it's either impaired waters if it's on the 303D list or if it's not on the 303D list.

[22:22] If it is on a 303D list, if they do exist, and basically it's either it's good, it's fair, or it's poor, based on these criteria of no listed watersheds, less than 10 percent or more than 10 percent.

[22:43] We also provide examples for them to use in case they had questions on what makes sense or what doesn't. There are rules like this for each of the 12 indicators. Actually, that information is available in the internet if you want.

[23:05] I want to say thanks to EPA for lending me this slide. This is a great example of what I mean by communication tool and how beneficial it can be working with partners and/or even within the Forest Service itself, just be able to see something graphically.

[23:26] Quickly, this is just some random watersheds. The red areas are the HUC 6s. Here, you have a TMDL section. These thicker lines are where there is actually TMDL in place. The green here are supporting waters. The yellows are impaired waters. Looking at them here, it's really hard to get a sense on how that impacts the watershed.

[24:01] EPA is beginning to model it into catchments where you can now take a look at the same watershed, and you can see where the catchments that are impacted by the 303D listed streams, or by the water quality.

[24:18] Looking at it on a map like this, it makes a lot more sense to the folks that we're working with, and to the people on the ground and our partners to show how projects within those catchment areas can impact, or which ones may impact the water quality in particular to the water quality issue. Thanks again to EPA for that.

[24:48] Looking at the other watershed condition indicators, there are many many sources of information for data and tools out there. Last week, I went to the science in your watersheds sites at USGS has. It has a link to, of course, the NAWQA Program that

is the national water quality assessment program. You can find links to the SPARROW model, and to WARP model.

[25:23] It's just a lot of information depending on what you already know about your data or about your watershed and what other tools you may need. Also, the EPA, the WATERS, which is the watershed assessment tracking and environmental result system, it contains lot of handy tools for people to use.

[25:47] and to be able to model their watersheds, if you have tried to surf your watershed, it has very specific localized information as well as a list to potential partners, people who are interested in helping out with the watershed restoration. On their own, what interests there are, what their specific areas of interest is or particular reach of stream, or particular attribute that maybe causing that.

[26:23] The last one I have here is the TerrainWorks, the TerrainWorks, or NetMaps I guess it's also referred to. It contains a lot of really important tools as far as fish habitat mapping, road analysis. It contains links to great analysis, the great geomorphic road analysis and inventory package.

[26:51] This is a tool developed by the Forest Service that really helps hone in on where the...so what it does is looks at the DEMs and looks at road systems. It can track pretty accurately the high impact areas of allowing sediment into a stream.

[27:15] If you're trying to figure out where we should do road work, you can take a look at those potential high impact areas and focus your efforts there. Again, it gives you a little road map on where to do the most work. Partners find that very, very valuable.

[27:31] As I said earlier, the data availability varied quite a bit as our areas. There are areas that are data rich, and areas that are data poor. Consistent as the rule set is across the United States to do these watershed condition assessments, the results vary also. We have to keep that at the back of our mind as we're looking at all this data.

[28:01] Quick summary, for the first time, we have a nationwide tool to systematically implement watershed restoration. We focused on partnerships. They are essential to the success of the WCF. As I said, communication tools are the key.

[28:22] We also recognize that the WCF is not perfect. There are questions about the indicators. How the management of the forest systems lands can actually impact the indicators whether or not you can see that result. We believe it will improve over time as we get used to it, and we begin to better understand its true applicability.

[28:50] Looking into the future, as I said, WCF is focused pretty heavily on the aquatic aspects. We would like to spend a little more time, a little more energy on the terrestrial aspect of the watershed restoration. Even doing veg management or for doing work in the upland, the waste in the water can impact the health of the stream and has say over the health of the whole watershed.

[29:21] We need to get a better understanding of that. We're going to continue to implement that and improve the WCF program. Also, right now, the field is undergoing a limited reassessment of some watersheds, so doing that step A all over again. That's being done with improved information and information of some data sets that didn't exist five years ago.

[29:48] In some areas, we've had pretty dramatic fires between five years ago and now, that impact the health of the watershed. There's a number of reasons why a forest would decide to do this reassessment. That's occurring now, and it should be completed by the end of February 2016.

[30:13] That's my talk for today. Again, I want to emphasize that the way that we can look at what needs to be done on the balance. The impact the restoration work has on the aquatic species, it's made fundamentally easier and more efficient through the use of the NHD and the WBD and the GIS tools that we have available to us.

[30:54] Are we ready to take questions?

Jeff: [30:56] Yes, we are, Mike. Thanks a lot. Good presentation. I appreciate that. We're going to turn it over to Sue Buto and Alan Rea to talk about some of the questions that have been coming in. Al, you might want to lead us by reminding people how they might be able to ask questions through the question and answer feature of the Webex.

Alan Rea: [31:16] OK, sure. This is Al. I'll explain that. On your screen, where you're seeing Mike's desktop, if you put your cursor up near the top, you should see a menu that will pull down. There's a Q&A button on that menu. It will open up a little panel. You can type your question in there. Sue and I will be viewing those, and we will ask those questions of Mike and get him to answer it.

[31:50] Sue, you've got one queued up and ready to go.

Susan Buto: [31:52] I do. Charlie Palmer is asking, does the WCF include Alaska?

Mike: [31:59] Yes, it does. We have two national forests in Alaska, the Chugach and the Tongass. Both of those have gone through the Watershed Condition Framework assessment.

Susan: [32:13] Thank you.

Mike: [32:15] Just real quick, should I hit the stop sharing button, and we'll go back?

Al: [32:21] No. We don't really need to, but yeah, you can go ahead.

Mike: [32:24] We'll leave this up. That's fine.

Al: [32:28] Yeah. It depends on if someone asked a question, specifically about a slide, so just keep it there for a sec. Another question came in asking about, that some HUC12s

are not true watersheds. Are you taking this into consideration in using the HUC12s for the basis of your assessments?

Mike: [33:01] I'm not sure. Maybe. Are they speaking of where it may be along a lake, and there's sometimes a number of smaller watersheds that are grouped together into a considered a subwatershed. I'm afraid I'm not understanding that question.

Al: [33:20] Right. The question is from Mark Webber. Mark, do you want to hit star six? You can unmute yourself if you want to explain more. He's talking about HUC12s that have upstream HUC12s from them. The HUC12 itself is in a full watershed.

Mike: [33:55] Right. That really comes into almost treating that watershed as a priority watershed. There are a number of instances where, for example, water quality impact or how the water quality is in the downstream watershed is really because of the upland or the upstream watershed water quality. Areas where there is a lot of mining are like that.

[34:26] The legacy mining that has occurred way upstream, that impact can be felt going downstream quite a way. There's a minimal amount of work that can be done in that downstream watershed to improve that water quality. Because again, the impact originates upstream.

[34:52] It all comes into when you choose your priority watershed, you try to figure out, "Hey, can we actually improve the condition of this watershed? And can we come up with projects to make this watershed healthier and move it up to the next condition class?"

[35:11] In a case like that where you have upstream impact and if it's outside your area of focus, then I would say that may not be your best choice for your priority watershed.

Susan: [35:28] Another question, Mike. Is the framework based on a snapshot of the WBD circuit 2011? If so, do you refresh or plan to refresh those data to capture updates in the dataset?

Mike: [35:46] The original was the 2011 dataset. I'm aging myself there. There was an update done, I believe, in 2013 or late '14. Actually, with that, there was some additional work done along the Canadian border at that time.

[36:12] The watersheds went from 15,064 up to 15,087. Those new watersheds are on the map of new watersheds. They had to be assessed for the first time by that national forest. We announced that just a few months ago about updating the WBD again.

[36:37] We found a very similar results based on some additional clarification down along Mexico. We do update them. However, the watersheds change or modified. We do update the scoring of those, either by scoring "a new watershed" or by assessing that new watershed.

Al: [37:08] We've got another question, and I'm not completely sure if I understand it, but I'll see if you do, Mike. Are the different activities ranked by use, such as active versus passive uses in comparing the type of activities on the watershed?

Mike: [37:33] No. Maybe it's comparing rank on the uses, no. That level of characterization is not done as far as impact to the watershed itself.

Al: [37:55] We haven't got any other questions in. If anybody has more questions, go ahead and ask them. I have one that I'll ask.

[38:07] It looks like your assessment units basically are the 12 digit HUCs. Are you finding that those are the right size for what you want to do, or do you find there is need for smaller units? I know that for some purposes, people have been talking about making smaller units than the 12 digit HUCs.

Mike: [38:26] That's a great question. We get that question a lot as far as how do we decide on a specific area. Going back to why we initiated the WCF to begin with is that we needed to show that what we were doing on the ground, the Forest Service, what the management was doing on the ground was able to improve the condition.

[38:53] What was decided was that the 12 digit HUCs which range between or 10 to 40 thousand acres. That was the right management unit size to do this. There are instances where actually people like to look at larger areas. For example, when you're talking about fish or looking at a danger or threat to fish and fish passage, a lot of that tends to be more of the 5th level HUC so a combination of a few.

[39:28] Looking at a larger landscape, because that's the focus area that you would see for that species. There is a give and take, certainly down at the catchment level. Smaller than the HUC12, there are certain areas where maybe some road work or some abandoned mine land work, would make a lot more sense to look at to see that smaller level.

[39:56] I think overall, aside from certainly rationale on both sides, the HUC12 seems to be a real good size for us. The work that we can do over that three to seven year period, it can be focused in that area. That seems to be a size that Congress or people that we're reporting to, they accepted it, and they accepted that size as our area. That actually means something to them.

[40:31] Bottom line now is HUC12s are where we are, there are times when we need to look bigger or smaller. But overall, the 12s are where we are.

Al: [40:43] Great, thanks.

Jeff [40:53]: We'll cut off the questions here and move on to the next presentation. I will point out that Mike's presentation will be available both as recording and as a transcript and as Power Point slides to you in a few days or weeks.

[41:01] Keep an eye on the USGS NHD website. That's just simply nhd.usgs.gov. Click on the Hydrography Seminar Series, and look for seminar five, and you'll find all the information you need for that.

[41:17] We're going to come up to our first lightning talk which is by David Richey on preserving high quality riparian vegetation. We'll give a chance for David to get his slides going there. While we're doing that, I'll tell you a bit about David.

[41:32] He's a senior GIS Analyst at the Lane Council of Governments in Eugene, Oregon. He has practiced spatial data analysis for 20 years with a research and professional focus on agricultural and riparian landscapes.

[41:45] His current work focuses on the McKenzie Voluntary Incentives Program, a payment for ecosystem services project protecting and restoring riparian vegetation, for the Eugene Water and Electric Board. David, we see your slides.

David Richey: [41:57] Do you hear my voice?

Al: [41:58] We hear your voice.

David: [42:00] Excellent.

Al: [42:01] Take it away for the next five minutes.

David: [42:03] All right. Again, my name is David Richey, I'm with Lane Council of Governments. Today, I'm talking about delineating an eligibility area for the McKenzie Voluntary Incentives Program or VIP.

[42:15] The VIP is a payment for ecosystem services riparian protection and restoration program. It's supported by multiple agency and community partners, and it's focused on engaging and enrolling private landowners in non compulsory actions that support multiple desired landscape functions with a focus on preserving drinking water quality.

[42:43] One element of the program is determining the eligibility or program area, those lands that are most significant for protecting water quality and riparian function. The McKenzie River provides drinking water to over 200,000 people in the Eugene Springfield area.

[42:52] We had a number of goals for delineating the program area. The first goal was to have it be credibly science based. For that, we turned to the Nature Conservancy's active river area model as a peer reviewed GIS model for characterizing the landscape.

[43:11] The second goal is that it's easily explained to lay audience. Again, this is an enrollment program for private landowners. We wanted to be able to describe the program areas, the area of dynamic connection and interaction between the water and the land through which it frequently or occasionally flows.

[43:28] This isn't specifically tied to flood events or flood frequencies. We wanted the delineation method to be repeatable in other watersheds. The model depends primarily on nationally available NHD and USGS DEM datasets.

[43:47] Lastly, we wanted the program to be useful for analysis and evaluation. The model defines or identifies a broad set of landscape elements rather than solely focusing on the riparian area. As part of its output, the model produces a cost surface, not necessarily a hard boundary increasing the flexibility of the output and its use.

[44:15] Again, this is the Nature Conservancy's active river area model. It estimates the riparian area as well as other landscape components, and it's not tied to a specific flood extent.

[44:27] In the use of the NHD and the USGS DEM, in particular it relies on the stream order attribute, which is not available throughout the US, at least at the high resolution level. Next month's the seminar might shed some light on that.

[44:45] The code is open, by which I don't mean it's open source but rather you can dig into the code. It isn't password protected, and the model is very rapid to deploy. It's well documented using known ESRI tools.

[45:00] Conceptually, the watershed is divided up into three longitudinal sections of headwaters, streams and rivers from these, three functional landscape types are identified. The active river area, wet flat areas, and material contribution areas. Again, the slope based cost surface model is used to identify these.

[45:21] Cost surface is calculated in a cellular basis, moving away from the water feature accumulating values as it goes. The values for each cell that are accumulated are generated by multiplying the slope times the distance traversing each cell. You could think of this as a proxy for water friction or for flood extent.

[45:43] The model is calibrated by comparing it against known flood datasets such as FEMA flood zones or if you have actual records of flood occurrence.

[45:54] In our work, we calibrated the model against a provisional USGS dataset describing the Holocene floodplain from Rose Wallack. Thresholds are set to cover the majority of the reference flood extent, and the results an active river area will exceed the reference feature in some areas and not in others.

[46:16] Other landscape types, such as the wet flat areas and so on, are calibrated against other known reference datasets. Again, for this program, because it's a riparian protection program, we focused on the riverine and stream delineations for program implementation.

[46:33] The model produces, again, these different landscape types, which we're looking at using future work with the Voluntary Incentives Program. The active river area is the focus of our program currently as it sets the program eligibility area for the VIP.

[46:50] On the left there, you can see a more full suite of the head water, stream, river categories by the three landscape types. Then, on the right there is the actual VIP initial program boundary.

[47:07] Again, this is a project that's been going on since 2010, 2011. We hope it continues on for years. It's supported by multiple partners. You can see their names here. And that's about it for this lightning talk. Thank you so much for your attention.

Jeff: [47:24] OK, David. Thanks a lot. Good. Once again, David's slides, this recording will be available in the next few days or weeks, and you'll be able to access that through the nhd.usgs.gov website. Click on Hydrography Seminar Series.

[47:42] We're going to go right to our next lightning talk, which is by Curtis Price. This is about streamgage drainage area boundaries. As Curtis sets up here, I'll tell you a little bit about Curtis.

[47:54] He's a Physical Scientist and GIS Specialist with the U.S. Geological Survey. He has been supporting GIS applications as a member of USGS Enterprise GIS team for more than twenty years. His research interests include raster data analysis and landscape characterization.

[48:11] If we have time after Curtis' talk, then you could ask questions to both David and Curtis. We're ready to take it away, Curtis. We see your slide, and welcome to the lightning talk.

Curtis Price: [48:28] OK. Thank you very much. I'm going to talk to you today a little bit about a project we got started last year, leveraging national datasets that now exist. I just want to say it's a really exciting time for all of us to be involved in GIS, because these national datasets are starting to allow us to do things we never could do before.

[48:48] I think the talks we've heard so far today really push that forward. I'm going to switch this slide right now and see if it changes for everyone else.

Jeff: [48:56] Yeah.

Curtis: [48:59] This is based on the Watershed Boundary Dataset, which is a national seamless watershed polygon fabric that covers the entire continental United States and Alaska and Hawaii, and a little bit of some other places, too.

[49:18] As was mentioned before, these watersheds aren't cumulative watersheds. Sometimes they flow from one to the other. They're not all what we call headwater watersheds. Some are coastal. They have all kinds of different things.

[49:32] One thing that's very wonderful about this dataset is that it's based on, it has local input in terms of where those lines get drawn. Because sometimes the DEM isn't the whole story sometimes some local things going on that make a difference.

[49:45] This data has been looked up by a lot of people that know about the landscape. When we use it with the rest of the NHD, it can be very powerful.

[49:58] Our problem here is we have drainage areas and watershed boundaries and we need them all the time. They're critical to analysis, all kinds of hydrologic data. I work within the water theme at USGS, so this is especially important to us.

[50:12] Delineations are done in different ways across the country, but we have this nationally consistent Watershed Boundary Dataset boundary that we can work with. If we could have a nationally consistent way of building watersheds from our USGS gages, that would be really great. It will benefit everyone that uses our data. That's why we're doing this.

[50:36] Here's the issue. We have a watershed. We have that watershed, it could have developed up a lot of ways. We might have gotten it from DEM. Something else, we might have delineated it off quad sheets, then we have the watershed boundaries, and we're not quite lined up on them.

[50:52] That's a problem, because if the gage was right on the WBD boundary that would be really great, so we can't do that. We want to somehow put these together and down near the tie point here, make a watershed then use the boundary of the Watershed Boundary Dataset above that.

[51:09] We have these ingredients. We have our watershed we got from somewhere. We have these WBD watersheds that exists. Then we have pour points that we're using that were developed using NHD plus. I urge you to come to the January meeting to learn more about what's happening recently with NHD plus it's pretty exciting.

[51:26] Here are some real life watersheds. I live down here. That's me that's my office right there anyway. There's a gage, USGS gage right here. It isn't quite on the boundary. What I'm going to do is I'm going to zoom in down here to this area in here, which is about two miles across.

[51:51] We're zoomed in here. Here's our USGS gage right here. It has it's own watersheds that may look like. There's some old lineup. Say we did our watershed with DEM or something. They may not line up exactly.

[52:04] What we want to do is get that. What we do is we do delineation. We take that delineation. We clip it to the bottom hydrologic unit. You can on the left there's one hydrologic unit. There's a from and a to code. On the right, we have another hydrologic unit with a from and a to code and we want to put them together.

[52:23] The easiest way to find out where that's going to be is to actually use the elevation derived location to define the pour point, which is the point at which this watershed in the left flows to the watershed on the right.

[52:35] We had this clipped area, and then we use this point to grab this whole HUC12. Let me go on to the next slide, you'll see what that looks like. You'll see this purple line here and it shows our original thing. Then we basically, once we got to the boundary, we'd grab the rest of it.

[52:54] Now, we have these two watersheds. That's our starting point. Then what we can do is, we can find all these blue lines here, or all the HUC12's upstream. Here are the two down here we were working with. These two, right here.

[53:08] Here's our little watershed, and our big one here. Then we can add, using the ToHUC attribute that's on every single HUC12, and everything upstream, like this. Until we have our wonderful put together watershed, that is a true complete watershed.

[53:22] Then we pass it around to the water science centers to go ahead and...We have offices around the country. They check them out, and make sure they're OK. That's my little timer going off there.

[53:33] Basically, we get them reviewed. Then when we're done with that, we can go ahead and load them up into the new data model that's going to be part of NHD. The fact that we have these national data sets makes it possible. These gage polygons will be available through the NHD. That's public and a batch download.

[53:51] We're still getting them completed, and we aim to provide a web service. For example, you're looking at a gage record on NWIS web, which is our service that serves our USGS surface water data. You can click a box and get the polygon. That's the idea.

[54:09] That's what I have today. Hopefully, we can do more about this later. I recommend the January talk to you, because it really focuses in on some of the raw data that's going to make even more analysis like this possible.

Jeff: [54:24] Good, Curtis. Geat job. Thanks, lots of good information there. Once again, Curtis' slides will be available through the hydro seminar series website at nhd.usgs.gov. This whole session has been recorded, so you'll be able to watch the recording. You'll also be able to read the transcript, so look for that.

[54:45] Also, as Curtis mentioned, we have an upcoming presentation January 21st, on high resolution NHDPlus, which is able to do a lot of things for us, as the program continues to produce more and more rich data on water in the United States. There is a poll question that we have about your opinion of this presentation, and we appreciate if you would fill out that poll, so we can find out what we can do better in the future.

[55:16] Tell us what worked about this, what didn't work about it, and then also suggestions for what we can do in the future. We're looking for your ideas about topics we can present. Please give those to us, and we'll line those up for the future.

[55:31] If you're doing interesting work, involving hydrography, and involved in the NHD, WBD, or NHDPlus, please help our seminar series, and offer to give a presentation. With that, any final comments, or questions, or answers from Sue or Al? Anything that is left hanging?

Al: [55:56] No, I don't think we had any additional questions.

Jeff: [56:00] OK, good. All right. With that then, we'll wrap it up for today. We're just a few minutes short of the hour. Thanks for attending, and we look forward to having you attend our next session. Thanks.

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